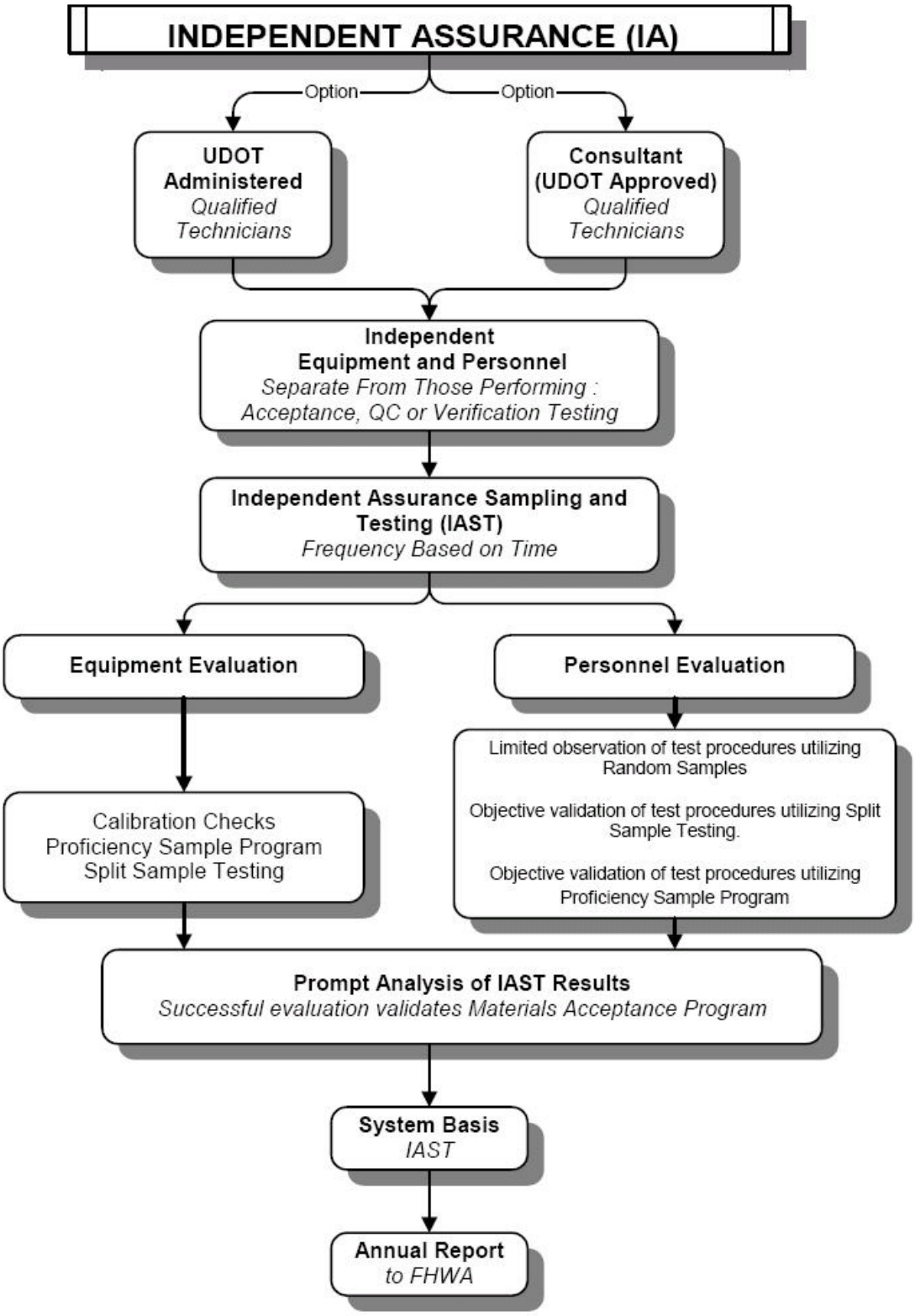
Section 1012 — Independent Assurance



Flow Chart #3

1012.1 Overview

The Independent Assurance (IA) program is an independent verification of equipment, sampling, and testing procedures and provides continuity to the Quality Assurance (QA) program; in accordance with 23 CFR (Code of Federal Regulations) Part 637.207. This involves a separate and distinct schedule for evaluation of equipment and technicians (testing personnel).

The IA program is system based and managed by central QA personnel. The Independent Assurance Inspector(s) (IAI) will be UDOT personnel and/or an AASHTO accredited designated agent, and will conduct Independent Assurance activities. System IA includes technician training and qualification, laboratory qualification, and equipment certification programs. The QA Section will evaluate Central Laboratory and Region Materials Laboratory, and Region Materials Laboratories will evaluate qualified technicians working in the Region, both UDOT field laboratory and consultant laboratory personnel and equipment used in quality acceptance activities. Consultant laboratories are expected to work with the Region IA Inspectors (IAI) and should prepare to perform IA testing at anytime at the request of the IAI.

All technicians will be evaluated a minimum of twice a year (calendar year) in performance of tests procedures in the area of qualification. All TTQP qualified sampling and testing personnel employed on UDOT projects are required to meet the Independent Assurance requirements. **Failure to participate in the Independent Assurance program will result in forfeiture of the technicians TTQP qualification in that qualification area.**

Verification of equipment evaluation will be a minimum of once a calendar year. Equipment utilized in quality acceptance activities will be evaluated in the IA split sample and proficiency sample activities a minimum of once a year. **It is the responsibility of the qualified lab to seek Independent Assurance. Failure to participate may result in suspension of qualifications as an approved lab.**

IA testing does not alleviate responsibility for obtaining and testing samples required under project specifications.

1012.2 Independent Assurance Frequency

Technician Independent Assurance shall be performed **at a minimum as outlined in *Schedule for Independent Assurance Sampling and Testing,* Section 1012.6**. Independent Assurance may also be performed upon request by, or for, a technician or laboratory.

Laboratory equipment is to be evaluated under the Laboratory Qualification Program MOI Section 1013 and Technician Independent Assurance Split Sample and Proficiency Sample Verifications. Laboratories must submit verification of compliance with Section 1013 to the Quality Assurance Section yearly as per 1012.5. A satellite laboratory's Quality System Manual will be inspected once a year for compliance by its umbrella laboratory. Documentation of satellite laboratories compliance must accompany the umbrella laboratories verification of compliance. 1013 Forms Appendix Equipment used in Quality Assurance activities will be used in Technician Independent Assurance split sample and proficiency samples at least once a year. If split sampling identifies equipment deviations, corrective action will be documented in the Quality Systems Manual.

1012.3 Verification Options

Options for performing Technician Independent Assurance sampling and testing are: split samples, limited observation, or proficiency samples Testing conducted as part of the TTQP Qualification courses is not acceptable as Independent Assurance. At least one split sample per test procedure is required per evaluation period.

Independent Assurance for Equipment used in Quality Assurance activities is a combination of calibration checks, as outlined in Section 1013, split samples and proficiency samples.

1012.3.1 Proficiency Samples

Individual samples of two slightly different lots of a given material are processed. Each participant receives a sample from each lot. The test procedures, as well as the equipment used, is evaluated and documented. Proficiency sample results are entered on the Laboratory Qualification site at: *http://168.178.125.73/mtl/proficiency_samples.asp.* Results are then evaluated using z-scores as outlined in Section 1012.3.3.1, Evaluating Split Samples.

When individual results of proficiency samples of zero or one are encountered the IAI shall immediately notify the Engineer for the participating laboratory and shall include any test results and documentation. The participating laboratory and IAI will determine and document the cause of the deviations and the steps taken to rectify the unacceptable results. Both the IAI and participating laboratory will keep documentation of the corrective action taken. When the corrective measures have been completed, split samples, as outlined in 1012.3.3 shall be obtained to verify correction of the problem.

1012.3.2 Limited observation

Limited observation may be conducted by the IAI or designated representative. Limited Observation may include, but is not limited to, efforts to meet personnel requirements of section 1013, TTQP qualification, and training demonstrations. (see 1012 Forms Appendix.)

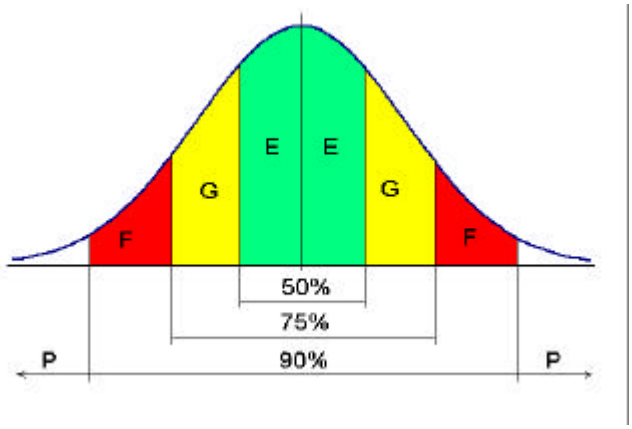
When unacceptable deviations from the test procedures are encountered, the IAI shall immediately notify the Engineer for the participating laboratory. The participating laboratory and IAI will determine and document the cause of the deviations and the steps taken to rectify the unacceptable results. Both the IAI and participating laboratory will keep documentation of the corrective action taken. When the corrective measures have been completed, split samples shall be obtained to verify correction of the problem.

1012.3.3 Split Samples

The IAI, or IA representative, and the participating technician(s) will obtain a split sample. The test procedures, as well as the equipment used, is evaluated and documented. The samples are tested independently and results from the samples are documented and reported.

1012.3.3.1 Evaluating Split Samples

Confidence Limits, Section 1012.7, provide a target for, and a means of, evaluating split sample tests between two labs. Confidence limits are produced through the use of interpretive statistics with the primary statistical tools being the standard deviation and the z-score or standard score. The limits have been set by establishing confidence intervals using the assumption of a normal population. The Confidence Limits have been set so that 50% of the tests performed will be “excellent”, 25% will be “good”, 15% will be “fair” and only 10% of the tests will be “poor.”



The first step in the split sample evaluation procedure is to calculate the difference between the test results. This difference is then noted and compared to the appropriate Confidence Limit. It is not the purpose of the IA program to compare the results from these tests to the specification requirements.

1012.3.3.2 Documentation of Results

Split Sample testing is documented on the applicable form in 1012 Forms Appendix.

Whenever deviations from acceptable test procedures and/or individual results of split samples of "poor" are encountered, the IAI shall immediately notify the Engineer for the participating laboratory and shall include any test results and documentation. The participating laboratory and IAI will determine and document the cause of the deviations and the steps taken to rectify the unacceptable results. Both the IAI and participating laboratory will keep documentation of the corrective action taken. The IAI shall forward a copy to the Quality Assurance Section if further action is required.

After corrective measures have been completed, additional split samples shall be obtained to verify correction of the problem for split samples with "poor" results or at anytime deemed necessary by the IAI.

1012.4 TTQP Qualifications and the IA Program

It is the responsibility of the qualified technician to seek Technician Independent Assurance.

Failure by any TTQP qualified technician, working on any UDOT project, to participate in the Independent Assurance program will result in forfeiture of the technicians TTQP qualification in that qualification area. Reinstatement will require re-qualification.

When a technician has not satisfied either of the minimum required evaluations at the end of the evaluation period (calendar year) the qualification for the area is forfeited. Technicians who receive original qualifications after October 1st will not be required to perform IA's until the next evaluation period (after January 1). If the technician has satisfied one evaluation at the end of the evaluation period, an extra three months is allowed to satisfy the requirements. This evaluation may not be used in the next evaluation period. At the end of the three-month extension, if the IA requirements are not satisfied the technician forfeits the qualification for the area. After a qualification is forfeited the technician must re-qualify in accordance with Section 1014.

If, through IA activities, a TTQP qualified technician is identified as unable or unwilling to perform sampling and testing according to procedures the IA representative will forward documentation to UDOT Qualification Committee for review under the TTQP Revocation, Suspension or Denial policy as listed in 1014.

1012.5 Annual Report of IA Program Results

The Region and Central Laboratories will submit an annual report to the Quality Assurance Section summarizing the results of the IA efforts in the Region and Central Laboratory. The Quality Assurance Engineer will submit an annual report to FHWA summarizing the results of the systems based IA program. The report will identify:

- The number of sampling and testing personnel evaluated including:
    - A percentage of IA testing complete for DOT personnel
    - A percentage for contractor personnel
    - A percentage for consultant personnel
- The personnel evaluated
- The percentage of equipment evaluated for UDOT, contractors and consultants.
- The frequency of evaluations
- The specific tests evaluated
- The evaluation results (the number of excellent, good, and poor results) for UDOT, contractors, and consultants
- A discussion of significant problems with testing procedures or equipment and results outside the tolerance limits
- A summary of any significant system-wide corrective actions taken.

1012.6 Schedule for Independent Assurance Sampling and Testing

A technician holding qualification in each of these fields shall be verified at a minimum of twice per calendar year in the following test procedures:

Embankment and Base and In-Place Density Testing Technician Qualification

AASHTO T 99/T 180 Moisture-Density Relations of Soils

AASHTO T 310 In-Place Density and Moisture Content of Soils and Soil Aggregates by Nuclear Methods

Aggregate Testing Technician Qualification

AASHTO T 27 Sieve Analysis of Fine and Coarse Aggregate

in conjunction with

AASHTO T 11 Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing

Asphalt Testing Technician Qualification

AASHTO T 30 Mechanical Analysis of Extracted Aggregates

AASHTO T 308 Determining the Asphalt Binder Content of Hot Mix Asphalt by the Ignition Method

AASHTO T 166 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated-Surface Dry Specimens

AASHTO T 209 Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

AASHTO T 312 Preparing and Determining the Density of HMA Specimens by Means of the Gyratory Compactor

Concrete Testing Technician Qualification

AASHTO T 119 Slump of Hydraulic Cement Concrete

AASHTO T 152 Air Content of Freshly Mixed Concrete by the Pressure Method

AASHTO T 23 Making and Curing Concrete Tests Specimens in the Field

Sampling, Reduction & Density

AASHTO T 310 In-Place Density and Moisture Content of Soils and Soil Aggregates by Nuclear Methods

Verification requires successful evaluation utilizing one of the Verification Options listed in 1012.3.
A successful evaluation is a result of “fair,” “good” or “excellent” for proficiency or split samples or an acceptable rating for Limited Observation. Additional split samples performed due to results of “poor” on proficiency or split samples, or an unacceptable rating on Limited Observation are to be considered a subsequent step in the original verification and not a separate verification. The Limited Observation verification option is not to be used in conjunction with a split or proficiency sample to satisfy two separate verifications.

1012.7 Confidence Intervals for Split Samples

Density and Moisture Content of Soils and Soil Aggregates by Nuclear Methods AASHTO T 310				
Properties	Excellent	Good	Fair	Poor
Nuclear Density (wet – lb/ft^3)	0.8	1.3	1.9	> 1.9
Nuclear Moisture (%)	0.5	0.8	1.1	> 1.1

Embankment and Base				
Properties	Excellent	Good	Fair	Poor
Optimum Moisture T 99 / T 180 (%)	1.0	1.5	2.2	> 2.2
Maximum Density T 99 / T 180 (lb/ft^3)	1.0	1.6	2.3	> 2.3

Hot Mix Asphalt AASHTO T 30				
Total % Passing a Sieve	Excellent	Good	Fair	Poor
< 100 ³ 95	1.2	2.0	2.9	> 2.9
< 95 ³ 40	1.2	2.0	2.9	> 2.9
< 40 ³ 25	0.8	1.4	2.0	> 2.0
< 25 ³ 10	0.8	1.3	1.9	> 1.9
< 10 ³ 5	0.5	0.9	1.3	> 1.3
< 5 ³ 2	0.4	0.7	1.0	> 1.0
< 2 ³ 0	0.3	0.5	0.7	> 0.7

Properties	Excellent	Good	Fair	Poor
% Asphalt AASHTO T 308	0.17	0.29	0.42	> 0.42
G_{mb} AASHTO T 166	0.021	0.036	0.063	> 0.063
G_{mm} AASHTO T 209	0.011	0.017	0.024	> 0.024

PCC Properties	Excellent	Good	Fair	Poor
Air AASHTO T 152 (%)	0.2	0.4	0.5	> 0.5
Slump AASHTO T 119 (in.)	0.25	0.25	0.5	> 0.5
AASHTO T 23 (28 Day Break) (psi)	330	560	800	> 800

Sieve Analysis AASHTO T 27 Coarse Aggregate and Fine Aggregate				
Total % Passing a Sieve	Excellent	Good	Fair	Poor
< 100 ³ 95	1.3	2.2	3.2	> 3.2
< 95 ³ 85	1.3	2.2	3.2	> 3.2
< 85 ³ 80	1.8	3.1	4.4	> 4.4
< 80 ³ 60	2.7	4.6	6.6	> 6.6
< 60 ³ 20	1.9	3.2	4.6	> 4.6
< 20 ³ 15	1.5	2.6	3.7	> 3.7
< 15 ³ 10	1.4	2.4	3.5	> 3.5
< 10 ³ 5	1.1	2.0	2.8	> 2.8
< 5 ³ 2	1.0	1.7	2.5	> 2.5
< 2 ³ 0	0.4	0.7	1.1	> 1.1

Sieve Analysis AASHTO T 27 Fine (- 3/8")				
Total % Passing a Sieve	Excellent	Good	Fair	Poor
< 100 ³ 95	0.7	1.3	1.8	> 1.8
< 95 ³ 60	0.7	1.3	1.8	> 1.8
< 60 ³ 20	1.3	2.3	3.3	> 3.3
< 20 ³ 15	1.0	1.8	2.5	> 2.5
< 15 ³ 10	0.7	1.2	1.7	> 1.7
< 10 ³ 2	0.6	1.0	1.5	> 1.5
< 2 ³ 0	0.3	0.5	0.7	> 0.7